Homework 4

Due date: September 28

1. The product rule says that for $h : \mathbb{R}^n \to \mathbb{R}$ and $f : \mathbb{R}^n \to \mathbb{R}^m$ one has

\[(fh)'(x_0) = f'(x_0)h(x_0) + f(x_0)h'(x_0)\]

where the last term is obtained from multiplying a column with a row matrix. Can you verify that by calculating the derivative of

\[F(x, y) = \begin{pmatrix} (3x + 5y)(e^x + e^y) \\ (4x + 6y)(e^x + e^y) \end{pmatrix}.

2. Calculate approximately $f(1.1)$ for

\[f(x) = \int_0^x \sqrt{x - \cos^2(s)}

(Hint: You might want to use the integral formula for cosecant at some later point of your argument).